

### Amendment to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

### Listing of Claims:

Claim 1. (currently amended) ~~An operation~~ A method of a kind of for using a heat treatment atmosphere cocatalyst. The characteristic consists in that in an apparatus comprising heat treatment equipment or heat treatment-gas producing equipment having an atmosphere, the method comprising:

dissolving or dispersing the cocatalyst is dissolved or dispersed into a heat treatment atmosphere material and atmosphere, and the cocatalyst keep up existing in the form of a gas phase or finer a very fine dispersion in the heat treatment atmosphere material; (such as mote) and

diffuse diffusing the cocatalyst into the atmosphere in of the heat treatment equipment or heat treatment gas-producing equipment.

Claim 2. (currently amended) ~~The method of using heat treatment atmosphere cocatalyst according to claim 1. The characteristic consists in that wherein the cocatalyst is diffused directly into the heat treatment atmosphere material or heat treatment atmosphere in the form of a gas phase or finer a very fine dispersion, or it the cocatalyst is dissolved or dispersed into a kind of or kinds of heat treatment atmosphere material as carry a carrying material agent to produce an admixture, and said admixture is fed into heat treatment equipment or heat treatment gas-producing equipment with atmosphere material together.~~

Claim 3. (cancelled) A kind of heat treatment atmosphere cocatalyst. The characteristic consists in that the cocatalyst keep in the form of gas phase or finer dispersion (such as mote), and diffuse into atmosphere material or atmosphere in heat treatment equipment or heat treatment gas-producing equipment.

Claim 4. (cancelled) The heat treatment atmosphere cocatalyst according to claim 3. The characteristic consists in that the cocatalyst is dispersed directly into heat treatment atmosphere material or heat treatment atmosphere in the form of gas phase or finer dispersion, or the cocatalyst is dissolved or dispersed into a kind of or kinds of carry material, then they are fed into heat treatment atmosphere material together in heat treatment equipment or gas-producing equipment.

Claim 5. (currently amended) The A cocatalyst for a heat treatment atmosphere material, cocatalyst according to claim 3 or 4. The characteristic consists in that the cocatalyst is comprising one or more components selected from the group consisting of:

Compound a halogen element compound which takes 0.1-4% by weight in the heat treatment atmosphere material, optimal selection: 0.1-1%;

Compound a metal element compound which takes 0.0003-0.03% by weight in the heat treatment atmosphere material, optimal selection: 0.0003-0.015%; and

Compound a nitrogen compound which takes 1-10% by weight in the heat treatment atmosphere material, optimal selection 1-2%;

Or said arbitrary combination. Wherein,

wherein said the Compound metal element compound is one or more than one compound selected from one or arbitrary combination from the group consisting of Cobalt cobalt naphthenate, Manganese manganese naphthenate, Nickel nickel nitrate, Manganese manganese nitrate, Ferrocene ferrocene, and as well as Ferrocene ferrocene ramification, optimal selection: Ferrocene, Ferroceneramification;

wherein said Said Compound halogen element compound is one or more than one compound selected from one or their combination the group consisting of Chlorobenzene chlorobenzene, Trichlorobenzene trichlorobenzene, Chlorotoluene chlorotoluene, Nitrochlorobenzene nitrochlorobenzene, Trichloroethylene trichloroethylene, Ribromomethane ribromomethane, Iodine iodine, Iodinated iodinated oil, Iodomethane iodomethane, Freone freone, Tetrafluoroethylene and tetrafluoroethylene. Optimal selection: Chlorobenzene, Trichlorobenzene, Chlorotoluene, Nitrochlorobenzene, or their combination;

wherein said Said Compound said nitrogen compound is one or more than one compound selected from one or arbitrary combination the group consisting of P-Amino-Azobenzene Hydrochloride p-amino-azobenzene hydrochloride, Nitrobenzene nitrobenzene, Toluenediisocyanate toluenediisocyanate, Nitrochlorobenzene nitrochlorobenzene, Nitrobenzene, Trinitrobenzene trinitrobenzene, Melamine melamine, Trieyanic acid tricyanic acid, Dicyandiamide dicyandiamide, Guanidine nitrate guanidine nitrate, Cyclotrimethylenetrinitramine cyclotrimethylenetrinitramine, Pyridine pyridine, Pyrazol pyrazol, and Pyraze pyraze. Optimal selection: P-Amino-Azobenzene Hydrochloride, Nitrobenzene, Toluene diisocyanate, Nitrochlorobenzene, Nitrobenzene, Trinitrobenzene, Guanidinenitrate, and Cyclotrimethylenetrinitramine or their combination; and

wherein said cocatalyst is capable of being maintained in the form of a gas phase or a very fine dispersion in the heat treatment atmosphere material.

Claim 6. (currently amended) The kind of heat treatment atmosphere cocatalyst according to claim 3 or 4. 5, further comprising:

~~The characteristic consists in adding certain a rare earth compound comprising of RE(lanthanum) or RE(cerium) which takes 0.1-3% by weight in the heat treatment atmosphere material; into heat treatment atmosphere or atmosphere material, such as~~

~~wherein said rare earth compound is selected from the group consisting of Cerium naphthenates cerium naphthenate, Lanthanum naphthenates lanthanum naphthenate, Cerium Nitrate cerium nitrate, Lanthanum nitrateinto lanthanum nitrate, Lanthanum lanthanum chloride, Cerium cerium chloride, lanthanum fluoride, and Cerium cerium fluoride. Optimal selection: Lanthanum Acetate, Cerium Acetate, Lanthanum Oxide, Cerium Oxide or their combination.~~

Claim 7. (currently amended) A method of for atmosphere heat treatment of a metal material. ~~The, said method includes comprising:~~

~~heat treating the metal material in the a heat treatment atmosphere with a cocatalyst or the an active heat treatment atmosphere produced by the said cocatalyst. The characteristic consists in~~

~~wherein said cocatalyst is diffusing diffused into said heat treatment atmosphere in the form of a gas phase or finer a very fine dispersion, and releasing releases out a active substance that activates the heat treatment atmosphere.~~

Claim 8. (cancelled) The kind of method of atmosphere heat treatment according to claim 7. The characteristic consists in the cocatalyst being dispersed directly into heat treatment atmosphere material or heat treatment atmosphere in the form of gas phase or finer dispersion. Or said cocatalyst said being dissolved or dispersed into a kind of or kinds of heat treatment atmosphere material as carry material, and fed into heat treatment gas-producing equipment or heat treatment equipment with carry material together.

Claim 9. (cancelled) The kind of method of atmosphere heat treatment in claim7. The characteristic consists in how to use the cocatalyst in claim5 or 6.

Claim 10. (cancelled) The method of atmosphere heat treatment in claim7□9. The characteristic consist in using the cocatalyst, carburizing or carbonitriding can be processed in a higher obviously carbon potential, optimal selection:0. 25, better optimal selection:0. 15, or in lower obviously temperature, or in short obviously time than without said cocatalyst.

Claim 11. (cancelled) A kind of metal material heat treatment atmosphere. Wherein the atmosphere includes a kind of material cocatalyst which is diffused into said atmosphere in the form of gas phase or finer dispersion and release a kind of material which play a part catalysis and activation to said atmosphere in heat treatment

gas-producing equipment or heat treatment equipment. Said cocatalyst is selected from the cocatalyst in claim3 or 4.

Claim 12. (cancelled) A kind of method raising carbon potential and/or depressing the produce of carbon soot, or lowering process temperature in the atmosphere heat treatment of metal material. The characteristic consist in adding the cocatalyst in claim3-6 into heat treatment atmosphere or heat treatment atmosphere material.  
<the following new claim covers the optimal weight percentages>

13. (new) The cocatalyst of claim 5 wherein the cocatalyst comprises at least one component selected from the group consisting of:

- a halogen element compound which takes 0.1-1% by weight in the heat treatment atmosphere material;

- a metal element compound which takes 0.0003-0.015% by weight in the heat treatment atmosphere material; and

- a nitrogen compound which takes 1-2% by weight in the heat treatment atmosphere material.

Claim 14. (new) The cocatalyst of claim 5 wherein:

- said metal element compound is at least one compound selected from the group consisting of: ferrocene, and ferrocene ramification;

- said halogen element compound is at least one compound selected from the group consisting of: chlorobenzene, trichlorobenzene, chlorotoluene, and nitrochlorobenzene; and

- said nitrogen compound is at least one compound selected from the group consisting of: p-amino-azobenzene hydrochloride, nitrobenzene, toluenediisocyanate, nitrochlorobenzene, trinitrobenzene, guanidine nitrate, and cyclotrimethylenetrinitramine.

Claim 15. (new) A composition of matter for catalyzing a reaction in a heat treatment atmosphere, said composition of matter comprising at least one component selected from the group consisting of:

- a halogen element compound which takes 0.1-4% by weight in the heat treatment atmosphere;

- a metal element compound which takes 0.0003-0.03% by weight in the heat treatment atmosphere;

and

- a nitrogen compound which takes 1-10% by weight in the heat treatment atmosphere;

- wherein said metal element compound is at least one compound selected from the group consisting of: cobalt naphthenate, manganese naphthenate, nickel nitrate, manganese nitrate, ferrocene, and ferrocene ramification;

wherein said halogen element compound is at least one compound selected from the group consisting of: chlorobenzene, trichlorobenzene, chlorotoluene, nitrochlorobenzene, trichloroethylene, ribromomethane, iodine, iodinated oil, iodomethane, freone, and tetrafluoroethylene;

wherein said said nitrogen compound is at least one compound selected from the group consisting of: p-amino-azobenzene hydrochloride, nitrobenzene, toluenediisocyanate, nitrochlorobenzene, trinitrobenzene, melamine, tricyanic acid, dicyandiamide, guanidine nitrate, cyclotrimethylenetrinitramine, pyridine, pyrazol, and pyraze; and

wherein said cocatalyst is capable of existing in the form of a gas phase or a very fine dispersion in the heat treatment atmosphere.

Claim 16. (new) A method for making a heat treatment atmosphere, said method comprising:  
combining the composition of matter of claim 15 with a heat treatment atmosphere material.

Claim 17. (new) A method for heating treating a metal, said method comprising:  
exposing the metal to the composition of matter of claim 15 in an apparatus comprising heat treatment equipment under conditions that are operative to achieve heat treatment.

Claim 18. (new) A method for making a heat treatment atmosphere, said method comprising:  
combining the composition of matter of claim 15 with a carrying agent; and  
dispersing the carrying agent in a heat treatment atmosphere material.

Claim 19. (new) A method for heating treating a metal, said method comprising:  
exposing the metal to the cocatalyst of claim 5 in an apparatus comprising heat treatment equipment under conditions that are operative to achieve heat treatment.

Claim 20. (new) A method for heating treating a metal, said method comprising:  
exposing the metal to the heat treatment cocatalyst of claim 6 in an apparatus comprising heat treatment equipment under conditions that are operative to achieve heat treatment.